PAROXYSMAL TACHYCARDIA IN CHILDREN.

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Simple paroxysmal tachycardia occurring in children below the age of ten years is admittedly rare, especially if unaccompanied by valvular lesions of the heart. The cases which form the basis of this communication are few, but they have the virtue of being among the youngest cases thus far reported, and for this reason are most instructive. In Case 1 at least there is a clue as to the possible origin or causal factor of this condition. In these children not only is the picture of the disease fully developed, but the cases show many points of approach to adult cases, at the same time points of difference which make them studies of great interest. Lewis in 45 cases of tachycardia, accompanied or unaccompanied by cardiac lesions, either of valves, muscles, or arteries, mentions only one case below ten years of age, that of a child aged six years. He states the actual age limits as six to seventy-five years, the highest incidence twenty to thirty years, the disease occurring more frequently in the male sex. I will not enter here into the general history of paroxysmal tachycardia, which is founded upon the phenomenon as seen in the adult; such does not interest us now. There is no communication, excepting isolated cases, in the literature on this condition as it occurs in children. I am inclined to the belief that the condition is not so rare among children as we would be led to believe from the fact of its dearth of a literature. The new instruments of precision in the study of cardiac disease must in the future bring to light new cases which will give us a more definite idea of its frequency and other facts which are now unobtainable. My own cases came to me quite accidentally in the course of an uncommonly large cardiac material, and I have been aided in fixing the authenticity of the clinical diagnoses by means of cardiogram tracings, some of which accompany this paper. All these tracings were made in the cardiogram laboratory of the Mount Sinai Hospital, under the direction of Dr. B. S. Oppenheimer. The first case, which is the youngest on record, is clinically of great interest, inasmuch as the child came to me with a history that two weeks before I saw him he had suffered from an angina of some duration; he had not made a prompt recovery, but had suddenly, after a tedious convalescence, passed into the condition which I will describe.

Case I (October 21, 1915).—A. A., male, aged twenty-two months; an only child; father and mother healthy young people;

mother had no miscarriages; normal delivery; fed on the breast for eleven months. When an infant had laryngismus stridulus; two weeks before the present illness he was ill with angina and bronchitis; when brought to me had been in this state for a day or more. He was much cyanosed and there was a general edema over the surface of the body; there was great dyspnea; the patient lay curled up on his side, which was the only position in which he could catch his breath with comfort. The examination of the lungs showed dulness and increased vocal resonance over the lower lobe behind on the right side. The liver was felt enlarged and soft some distance below the free border of the ribs; the spleen was much enlarged; the pulse could not be counted at the wrist, but over the apex varied from 224 to 280; the dyspnea was great. The case acted on the first visit in the manner seen in sudden cardiac failure in infectious diseases, such as in pneumonia in children or complicating diphtheria. The prognosis was placed seriously, and his physician advised to administer digipuratum intravenously. After a few days the heart quieted down, became slower, and in four weeks not a trace of the above attack was left. It seemed as though the boy had been saved by the prompt treatment. Two months after the attack the father noticed that the patient had spells of "cardiac irregularity" or palpitation, and with the coöperation of his physician (Dr. Doughty) I took him into my hospital service for future study. The subsequent history is best told by the hospital entries:

January 30, 1916. *Physical Examination.*

General condition: Child, very well nourished; color good.

Head: Frontal and parietal bosses.

Eyes, ears, nose: Negative.

Mouth: Tonsils enlarged but not inflamed. Throat and tongue clear.

Neck: No rigidity.

Glands: No adenopathy.

Chest: Moderate beading of ribs and Harrison's groove. When child cries there is marked inspiratory recession of the lower sternum and xiphoid.

Lungs: Clear.

Heart: Not enlarged; sounds of good force and quality. No murmurs.

Pulse: Equal; regular; good volume; tension.

Abdomen: Relaxed.

Liver: Edge felt one finger-breadth below ribs.

Spleen: Not felt.

Genitals: Negative.

Extremities: Knee-jerks.

Synopsis: Frontoparietal bosses; beading of ribs; Harrison's groove; depression of lower sternum.

February 2. This morning patient in a quiet condition after a slight crying spell; has pulse rate of 288. Slight edema of eyelids. While in an apparently quiet condition and playing, 240. A third count makes it 270. Slight edema of surface. No enlargement of liver. No cyanosis. In a second crying spell the pulse was 126.

12.30. Crying. Heart rate 104; slowing especially on strong inspiration.

February 3. Electrical galvanic test: AO and AC greater than KO and KC. AC and AO at 1½ milliampères. Tetanus with AO and AC of 3½ milliampères.

February 3. Electrocardiograms are normal in an interval of tachycardia.

February 4. During a crying spell pulse rate was 132 per minute. Apex in sixth space 6 cm. from median line. Right ventricle 2 cm. from median line. No dulness behind sternum. Heart sounds normal.

February 1. Urinalysis: Acid; microscopically, negative.

February 2. Acid, 1030; microscopically, negative.

February 5. Roentgen-ray report: roentgen examination of the chest does not show any definite evidence of an enlarged thymus. The heart is approximately normal in size and shape.

The patient was readmitted to my hospital service February 1, 1917, for further study, with the history that until October, 1916, he had been quite well, of course, under the care of his physician, who under my direction had given him digitalis. The drug was not well borne, however, the pulse being depressed at one time below 60 per minute. Since October the patient had had five attacks of tachycardia, observed by the parents. At these times they had learned to know of the attacks, as the boy would complain of feeling tired and would lie down. During the preceding summer he had no attacks. A week before readmission he had a sharp pain in the precordium during the attack, with drowsiness.

The patient was readmitted to the hospital February 1, 1917.

Physical Examination. General condition: good; well nourished; not acutely ill.

Head, face, neck, eyes, ears, and mastoids: Negative.

Mouth: Tongue moist; coated; teeth good; tonsils both enlarged.

Chest: Expansion fair and equal.

Lungs: Clear.

Heart: Normal in size and position. No murmurs or accentuations.

Pulse: Equal, regular; fair tension; normal rate.

Abdomen: Soft; rounded; generally tympanitic; ulcer; no masses; no rigidity.

Liver: Upper border, fifth rib; lower border, edge felt 3 fingerbreadths below costal margin.

Spleen: Not felt.

Kidneys: Not felt.

Synopsis: Palpable liver.

February 2. Pulse rate 270 (?); counting with stethoscope $\frac{1}{6}$ of a minute, 43 to 45 (Dr. Koplik).

Apex during attack $7\frac{1}{8}$ cm. to left of median line; right side $3\frac{1}{2}$ cm. from midline.

Liver and spleen: Not palpable.

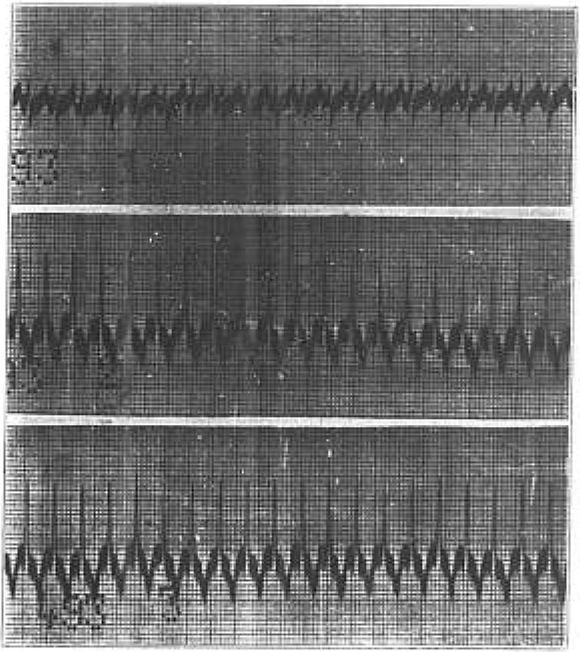

FIG. 1

Color: Normal; no cyanosis; very slight puffiness under eyes. When undisturbed there is tendency of child to lie on side.

February 3. Pulse 168.

February 5. Pulse 108 by auscultation; patient sitting and happy.

February 6. Rate 96.

February 7. Tonsils enlarged, particularly on left side.

Electrocardiogram, February 2, 1917, 493. The rate is 255 per minute. The tachycardia is regular, of auricular origin (auricular tachysystole). The *R* waves are small in lead *I*, normal in size in leads *II* and *III*. The wave which appears to be the *T* wave is upright in lead *I*, inverted in the other two leads. *P* and *T* cannot be positively identified.

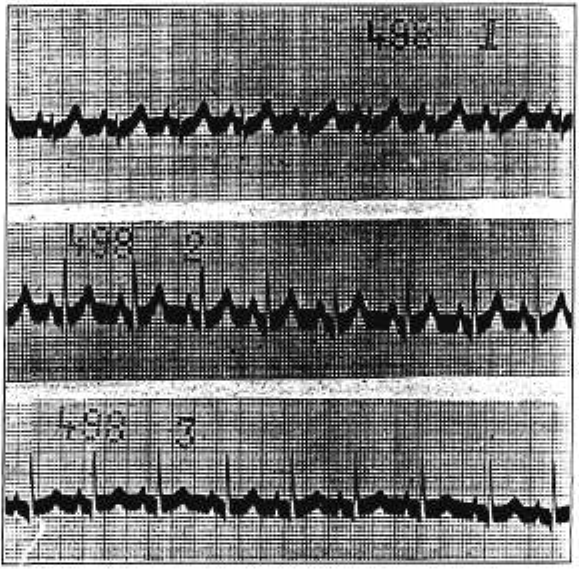

FIG. 2

Electrocardiogram, February 6, 1917, 498. The electrocardiogram shows a return to normal rate. The *T* waves in lead *I* and *II* are unusually tall and prominent. The *P* waves are also prominent and slightly angular. Except for the tall *T* waves the electrocardiograms are now normal.

DISCUSSION. This case is remarkable, first having been observed in the primary attack after an attack of the grippe, in which the symptoms were those of an acute break-down or weakness of the heart, with exceedingly rapid rate and signs of weakness of the heart in edema of the general surface of the body, cyanosis, swelling of the liver and spleen, and great dyspnea, as seen only in impending death. An improvement and apparent cure took place, and then a period of comparative comfort and freedom, followed by regular attacks of paroxysmal tachycardia of varying duration. One attack in the hospital lasting a few hours and another fully twenty-four hours. The spleen and the liver never enlarged to the extent in the subsequent as in the first attack. The cyanosis did not reappear nor did the general edema after the first attack. During the habitual attacks or paroxysms the boy was not uncomfortable. He would at times sit and play with a rate of 204 pulse, at others would lie quietly in his crib, pale, eyelids slightly puffy, and say he felt tired. Otherwise between the attacks he impressed one as an exceedingly bright, active child of good color, with marks of early rachitis. It is possible in this case to assume that the first attack of influenza was the starting-point of his affection and that the cardiac collapse of the first attack was the forerunner of the subsequent attacks, and that in this case there was a serious involvement of the myocardium as the result of the influenza. A tachycardia was thus established on the foundation of some form of infective myocarditis.

CASE II.—The second case which I have to report came under my notice when the patient was three years old. The previous history taken in my office states that as an infant her physician, when she was six months of age, told the parents the baby had a rapidly beating heart. This was brought to their notice every few months, and the symptoms had subsided, or were not noticed again, until three months before she was seen by me. A physician again told the parents that the child's heart was weak. I then sent her to my service for study.

J. S., female, aged three years, admitted to the hospital April 21, 1916.

Family History. Father and mother living and well; one sister, six months old, well.

Past History. Normal delivery; weight at birth eight pounds. No other illness up to the present. Had tonsillitis. Has not had measles.

Present Illness. Patient has had attacks of palpitation for the past three months. The last attack still persists. Patient has no dyspnea; does not cough. No bloody expectoration. When she gets her paroxysmal attacks, patient feels like vomiting, but only does so on rare occasions. No gastro-intestinal symptoms; no urinary disturbances. Has no visual or aural disabilities. Appetite poor.

Synopsis: Palpitation occasionally for three months.

April 21: Physical examination (a few hours later).

General condition: Good. Patient fairly well nourished.

Head: Well formed.

Face: Negative.

Eyes: Negative; no petechiæ, palsies, icterus, or nystagmus.

Ears, nose, mastoids: Negative externally.

Mouth: Teeth in good condition. Tongue coated and moist. Throat clear. Tonsils enlarged. No exudate.

Neck: Negative.

Chest: Well formed; expansion fair and equal.

Lungs: Anterior and posterior, negative; no dulness or rales.

Heart: Apex beat not seen or felt; no thrills or abnormal pulsations. Upper border, third rib; right border, right sternal margin; left border, two and a quarter inches from median line. Action regular; fair force; extremely rapid (240 at apex); sounds clear; no murmurs; no accentuations.

Pulse: Equal; regular; rapid.

Abdomen: Lax; tympanitic.

Liver: Upper border sixth space to one-half inch below costal border, where edge is distinctly felt.

Spleen and kidneys: Not felt.

Skin: Negative.

Glands: Negative.

Spine: Negative.

Extremities: Upper, negative. No clubbing of fingers or incurving nails.

Extremities: Lower, negative.

Synopsis: Cardiac condition.

May 8: Child in bed, quiet, smiling. Pulse rate 228.

May 8: Electrocardiogram No. 168 shows a tachycardia of approximately 250 ventricular beats per minute. The *P* waves (auricular) cannot be identified, but are probably combined with the *T* waves, probably falling on the descending limb of the wave.

Heart action is regular, the ventricular complexes during the tachycardia resembling the ventricular complexes taken on April 22, when the heart action was comparatively slow, so that one may assume that the impulses during the paroxysm of tachycardia are supraventricular in origin. It may be safely said that the tachycardia is not ventricular in origin.

May 25. Electrocardiogram taken in an interval in which there was no tachycardia shows a pulse rate of 108 beats per minute. The *P* wave is tall in lead *I*. The *T* wave is inverted in lead *II*. The *P* wave in lead *III* is well marked and upright.

May 26. The record of electrocardiogram is the same except that in lead *III* the *P* wave is so little marked as to be indistinguishable and in certain cycles is diplasic.

Discussion. In this case I saw the child when the cardiac condition was well established and observed the attacks of tachycardia then. The objective symptoms were few; the child would sit up in bed and play with the heart beating at an incredible rate. The attacks were paroxysmal, and in the interval the child, though pale, was not noticeably a sick child. In an attack the child was pale and nervous, but only slightly so; irritable; no swelling of the liver or spleen; no puffiness of the face with simply an indisposition to be disturbed. The child slept well; appetite was good; there were surprisingly few symptoms objectively and subjectively.

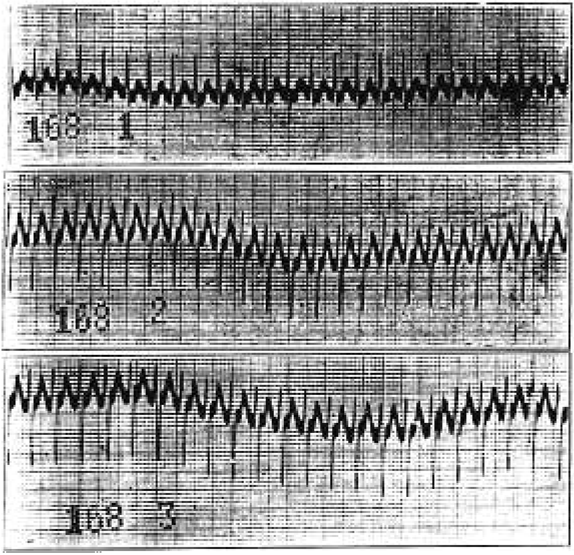

FIG. 3

CASE III.—The third case which I have to report has been under observation for two years in my service at the hospital, having been readmitted twice for his malady. He presents several features, in addition to those observed in the other cases, which I will try to bring out.

S. P., male, aged ten years, admitted June 16, 1915; discharged August 25, 1915.

Diagnosis. Paroxysmal tachycardia; auricular flutter.

Chief Complaint. Cardiac palpitation.

Family History. Father and mother are living and well. Three brothers and sisters are living and well.

Past History. Had measles; no scarlet fever; no sore throats.

Present Illness. Two months ago (?) patient had abdominal pains and vomited often. No cardiac palpitation noted at this time; child did not appear to be weak and played around. Five days ago began to vomit again, at this time cardiac palpitation was noted and the child became very weak and was unable to walk up steps. Bowels constipated.

Examination. General condition fair; moderate cyanosis of lips and ears.

Mouth: Both tonsils contain cheesy follicles, are ulcerated, and contour irregular. Palpable externally.

Nodes: Cervical; axillaries and inguinal nodes palpable.

Skin: Scars on chest and abdomen.

Lungs: Negative.

Heart: Upper border, third rib; right border midsternal line; left border, three-quarter inches to left of midclavicular line. Apex in sixth space.

Pulse: Absolutely irregular periods of tachycardia followed by slow pulse, the beats of which are irregular.

Heart: Action is irregular; first rapid and then slow; sounds of poor quality and valvular in character. No murmurs. Apex beat 200 per minute.

Liver: Sixth rib to one finger-breadth below umbilicus. Liver is tender on palpation.

Spleen: Not felt.

Extremities: Knee-jerks present; no edema.

June 29. Heart rate slow, between 70 and 80 per minute. Action irregular in force and rhythm. No murmur heard.

July 1. Marked tachycardia. Apex rate 208. No murmurs heard. Pulse rate difficult to count, small beats being missed about 130. Observed to have continued twelve hours (morning and evening rounds).

July 2. Cardiac rate 100, irregular. Pulse rate 54, very irregular; pulse deficit 46.

Cardiac rate 104, very irregular.

July 5. Tachycardia lasting several minutes observed. Therefore observation of July 1 may indicate constant tachycardia of twelve hours' duration.

August 7. Pulse and ventricular rate equal and regular, 88 per minute. Veins in neck, however, seem to pulsate much more rapidly —too rapidly to be counted. Venous pulsation seems to be rhythmical, now that ventricular action is slow and regular.

August 9. Pulse rate 100 for two consecutive minutes. Occasional extrasystole present.

August 16. Heart action still slow and moderately irregular.

August 22. Heart action now perfectly regular, about 100 per minute.

Temperature. June 16 to August 25, 98 to 99.2, with occasional rises to 100 or 100.2.

Weight: June 21, 44 pounds 7 ounces; August 22, 50 pounds.

Urinalysis: Usually amber; acid; specific gravity varied from 1012 to 1022, on two occasions there was a faint trace of albumin, microscopically there were white blood cells, and on June 25 there were occasional red blood cells.

Readmitted: September 24, 1915. Patient was discharged from the hospital on August 25, 1915. Felt well until yesterday morning, when he had dyspnea and had slight epigastric pain and vomited. Toward evening his heart began to beat rapidly, causing distress.

Examination: General condition fair; rather marked degree of pallor; respiration increased; somewhat dyspneic.

Eyes: Pupils equal; react to light; no petechiæ.

Mouth: Teeth in bad condition; tongue moist. Tonsils moderately enlarged, irregular in contour.

Glands: Few cervicals; axillaries and inguinal nodes palpable.

Skin: Scar over epigastric region.

Lungs: Negative.

Heart: Action slow; regular; sounds are of good quality; no murmurs; no pulse deficit: no tachycardia. (On admission heart action was very rapid, 190 beats per minute, pulse 130.)

Abdomen: Soft; lax; tympanitic; no fluid.

Liver: Upper border, fifth rib, to one finger-breadth below free costal border, where edge is indistinctly felt.

Spleen: Not felt.

Genitalia: Negative.

Extremities: Knee-jerks present; no edema.

September 8. Cardiac rate during stage of tachycardia 270 (during last few seconds heart was breaking into slow rhythm). Duration of tachycardia about two minutes, regular. Cardiac rate during slow period 104 and irregular.

September 15. Heart action slow and regular. Liver has receded in size to costal margin.

Temperature: September 24 to October 22, irregularly 98 to 100.

Urine: September 24 to October 22, usually amber; acid; specific gravity varied from 1012 to 1024; microscopically occasional white blood cells.

Laboratory Examination: September 20, Wassermann reaction negative.

Readmitted October 2, 1916.

Present Illness. Since leaving hospital two and one-half months ago patient has been at Rockaway Beach. Has had repeated attacks of cardiac palpitation, headache, and nausea, with free intervals of five days to two weeks. Present attack began fifteen days ago.

Synopsis. Since leaving hospital two and one-half months ago repeated attacks of palpitation and nausea. Present attack, fifteen days' duration.

Physical Examination.

General condition: Good. Patient comfortable; not acutely ill.

Head and neck: Negative.

Mouth: Left tonsil shows small exudate; tonsils slightly enlarged. Teeth in poor condition.

Thorax: Chest well and equally developed. Respirations free, equal.

Lungs: Resonant throughout; no rales or rubs.

Heart: Action regular; very rapid; sounds clear; no murmurs or thrills. Apex fifth space.

Pulses: Equal; regular; extremely rapid.

Liver: Upper limit sixth rib; lower border not felt below border of ribs.

Abdomen: Rounded; soft; no masses or tender points.

Spleen and kidney: Not felt.

Abdominal reflexes: Present.

Liver: Felt two inches below costal margin.

Extremities: Normal knee-jerks.

Skin and glands: Negative.

Spine and joints: Negative.

Synopsis: Cardiac condition.

October 5. The tachycardia noted on admission has subsided.

November 26. Tachycardia pers'sts.

November 29. Tachycardia has been present for the past twenty-four hours, which is only one of a series which has been continuous for the past few days. Impossible to fix exact duration, both at base and apex. Signs of irregularity and premature contractions. Pulse at wrist small but very rapid, 216 at right radial; left radial pulse not so distinct, cannot be counted. Apex 216, 216 at base.

November 29. Tachycardial attack still present. Pulse at wrist 192. Pulsation of jugular of right and left side of neck. Slight puffiness of eyes and brownish color of face. Liver just palpable but not enlarged. Spleen enlarged. Child not uncomfortable.

December 1. Attack still persists. Irregularity present.

December 3. Tachycardial attack has ceased.

December 9. Marked tachycardia this morning.

Urinalysis. Clear; acid; 1014 to 1030; albumin occasionally, very faint trace; microscopically negative.

The electrocardiograms taken in this case are exceedingly numerous, and may be summerized as follows:

1. A condition of auricular flutter with varying degrees of heart-block 2 to 1 or 3 to 1. There were also ventricular extrasystoles arising from the right ventricle.

2. An auricular tachycardia (auricular tachysystole) which in one cardiogram showed in leads *I* and *II* that every third auricular beat was blocked and not followed by a ventricular response. In lead *III* the auricular and ventricular beats were equal, the rate of both being 225.

3. An auricular rate of at times 180 to 192 beats with ventricular rate depending on the grade of heart-block 2 to 1 or 3 to 1.

DISCUSSION. This is a case of paroxysmal tachycardia in which the paroxysms may be very short, extending in one actual instance over three minutes and in another over forty-eight hours. In those paroxysms in which the attacks are prolonged it is to be assumed that there may be short periods of rest to the heart which have been interspersed in the prolonged attack. During an attack the rhythm of the heart is very irregular at times, and there are periods of auricular flutter with heart-block. Between the attacks the rhythm of the heart may be also irregular or show periods of block even when digitalis has not been administered. The duration of the attacks has been referred to. A study of the cardiograms shows that this case is one of auricular tachycardia, as is also the first case. The second case being particularly, according to the cardiogram report, one in which the impulses, during the paroxysm of tachycardia, are supraventricular in origin. A study of the pulse respiration ratio in cases 1, 2, and 3, are given here, with the reservation that the pulse counts were made in a clinical way at the wrist or carotid by nurses in the wards, and must be thus adjudged. As one would expect, *a priori*, the respirations are increased with the pulse rate, but there is nothing objectively approaching what we would name dyspnea. The children did not present the appearance of respiratory distress at any time. To be sure, they were confined to their cribs during the attacks.

PULSE AND RESPIRATION RATIOS. CASE I.

		Respiration.	Pulse.
January	30, 1916	32	124
	31, 1916	28	128
February	1, 1916	28	120
	1, 1916	24	80
	2, 1916	28	76
	2, 1916	44	216
	2, 1916	40	136
	2, 1916	32	120
	2, 1916	28	84
	3, 1916	30	116
	3, 1916	28	96
	4, 1916	32	118
	4, 1916	30	100
	5, 1916	30	96
	5, 1916	28	118
	5, 1916	28	108
	5, 1916	24	88
	6, 1916	28	80
	6, 1916	28	128
February	1, 1917	26	108
	1, 1917	28	(?) 180
	2, 1917	26	(?) 204
	2, 1917	28	180
	3, 1917	26	128
	3, 1917	28	96
	4, 1917	26	116
	4, 1917	26	120
	5, 1917	26	108
	5, 1917	28	100
	5, 1917	26	104

PULSE AND RESPIRATION RATIOS. CASE II.

		Respiration.	Pulse.
April	21, 1916	28	156
	21, 1916	36	140
	22, 1916	36	108
	27, 1916	26	92
May	1, 1916	28	100
	4, 1916	24	70
	8, 1916	24	228
	9, 1916	24	78
	11, 1916	36	200
	11, 1916	26	240
	17, 1916	36	200
	17, 1916	28	192
	20, 1916	40	108
	22, 1916	28	208
	25, 1916	24	92
	26, 1916	24	120
	27, 1916	36	212
	30, 1916	24	96
June	1, 1916	20	92
	4, 1916	20	80
	6, 1916	36	92
	7, 1916	36	250
	8, 1916	44	205
	8, 1916	32	160
	9, 1916	28	112
	10, 1916	36	200
	11, 1916	38	248
	12, 1916	28	100
	13, 1916	20	88
	14, 1916	28	110
	14, 1916	26	84
	15, 1916	26	84
	16, 1916	20	104
	17, 1916	32	128
	18, 1916	24	100
	20, 1916	20	84
	21, 1916	24	96
	22, 1916	24	120

PULSE AND RESPIRATION RATIOS. CASE III.

			Respiration.	Pulse.
June	16 to June	22, 1915	30	160
	16 to	22, 1915	24	96
	23 to	29, 1915	24	92
	23 to	29, 1915	24	76
	30 to July	6, 1915	24	94
	30 to	6, 1915	24	80
July	7 to	13, 1915	28	96
	7 to	13, 1915	24	80
	14 to	20, 1915	24	100
	14 to	20, 1915	24	80
	21 to	27, 1915	24	102
	21 to	27, 1915	24	80
	28 to August	3, 1915	24	154
	28 to	3, 1915	24	80
August	4 to	10, 1915	24	104
	4 to	10, 1915	20	80
	11 to	17, 1915	24	96
	11 to	17, 1915	22	88
	18 to	24, 1915	28	112
	18 to	24, 1915	22	88

PULSE AND RESPIRATION RATIOS. CASE III (*continued*).

	Respiration.	Pulse.
September 4, 1916	34	144
10, 1916	30	136
17, 1916	28	100
24, 1916	24	96
28, 1916	24	108
October 4, 1916	24	56
15, 1916	24	88
31, 1916	24	84
November 10, 1916	24	162 (?), 176 (?)
12, 1916	24	80, 120, 110
15, 1916	24	108, 64
26, 1916	24	90
29, 1916	24	162, 196, 88
December 5, 1916	24	60
10, 1916	24	104
12, 1916	24	112
17, 1916	24	72
26, 1916	24	54
January 6, 1917	24	72, 80, 90
14, 1917	24	70
February 11, 1917	24	90
16, 1917	24	84
19, 1917	24	88
March 2, 1917	20	72
9, 1917	24	104
11, 1917	44	160
14, 1917	20	104
17, 1917	22	80
19, 1917	24	112
19, 1917	20	84
30, 1917	28	120
April 1, 1917	24	104

APRIL 5, 1917. A PAROXYSM, TACHYCARDIA.

		Pulse.	Respiration.
2.45 P.M.	Attack started	144	32
3.00 P.M.		208	44
3.15 P.M.		196	40
3.30 P.M.		200	40
3.45 P.M.		192	38
4.00 P.M.		200	40
4.15 P.M.		204	42
4.20 P.M.		100	(a pause) 26
4.30 P.M.		180	40
5.00 P.M.		184	38
5.30 P.M.		192	40
6.00 P.M.		188	38
6.30 P.M.		180	36
7.00 P.M.		184	30

APRIL 8, 1917.

		Pulse.	Respiration
10.00 A.M.	Attack started	200	40
10.30 A.M.	....	180	40
11.00 A.M.	....	192	38
11.30 A.M.	....	196	38
12.00 M.	Pulse intermittent	188	36
12.30 P.M.	....	192	36
1.00 P.M	....	196	38
1.30 P.M.	....	192	36
2.00 P.M	....	196	36
2.30 P.M.	....	196	36
3.00 P.M.	....	180	32
3.30 P.M.	....	176	32
4.00 P.M.	....	168	30
4.30 P.M	....	164	28
5.00 P.M.	....	164	28
5.30 P.M.	....	150	28
6.00 P.M.	Pulse intermittent	150	28
6.30 P.M.	....	130	26
7.00 P.M.	....	130	26
7.30 P.M.	Attack ceased	120	28
9.00 P.M.	....	96	24
11.00 P.M.	....	96	26
12.00 MID.	....	100	24
12.30 A.M.	....	104	24
1.00 A.M.	....	104	24

Additional studies of the pulse and respiration ratios in Case III (S. P.), showing the interpolation of short paroxysms of tachycardia and duration of paroxysms.

APRIL 13, 1917.

Time.	Pulse. Radial.	Apex.	Nurse's notes.	Respiration.
12.30 A.M.	80	..	Attack started; intermittent.	24
1.15 A.M.	56	..	Irregular, of fair quality, at first feeling rapid and fluttering, and suddenly dropped to perceptible amount of 56.	24
1.35 A.M.	56	..	....	24
2.00 A.M.	?	?	Fluttering.	24
2.30 A.M.	104?	..	....	24
3.00 A.M.	80	104	....	24
3.30 A.M.	92	..	....	24
4.00 A.M.	76	?	Very irregular.	24
5.00 A.M.	88	120	Radicle irregular; apex bounding.	24
5.30 A.M.	?	160	....	24
6.00 A.M.	?	200	Complains of sticking pain in left axilla.	22
6.30 A.M.	?	136	Respirations abdominal and seem restrained on patient's part.	24
7.00 A.M.	?	200	....	24
7.30 A.M.	?	204	....	26
8.00 A.M.	?	196	....	26
8.30 A.M.	?	196	....	24
9.00 A.M.	?	192	....	24
9.30 A.M.	?	196	....	24
10.00 A.M.	?	192	....	24
10.30 A.M.	?	180	....	24

APRIL 13, 1917 (*continued*).

Time.	Pulse. Radial.	Apex.	Nurse's notes.	Respiration.
11.00 A.M.	..	176	....	24
11.30 A.M.	?	?	....	24
12.00 NOON	..	152	....	24
1.00 P.M.	..	168	....	24
2.00 P.M.	..	168	....	24
2.30 P.M.	..	172	....	22
3.00 P.M.	..	170	....	24
4.00 P.M.	..	160	....	24
4.30 P.M.	..	164	....	22
5.00 P.M.	..	172	....	24
5.30 P.M.	..	176	Attack still on; pulse imperceptible at times; patient has headaches and complains of pain in left axilla occasionally.	24
6.00 P.M.	..	180	....	26
6.30 P.M.	..	172	....	24
7.00 P.M.	..	176	....	24
7.50 P.M.	88	88	Intermittent.	24
7.55 P.M.	128	..	....	24
8.30 P.M.	..	188	....	24
9.00 P.M.	116	..	Pulse varied, 88 to 188; respirations 24.	24
10.00 P.M.	96	..	Distinctly tricotic at 188.	24
11.00 P.M.	120	..	....	24
12.00 MID.	..	144	....	24

Pulse and respiration ratio and short momentary tachycardial paroxysms in the intervals of prolonged paroxysms.

CASE III. APRIL 14, 1917.

Time.	Pulse. Radial.	Apex.	Nurse's notes.	Respiration.
1.00 A.M.	88	..	....	24
2.00 A.M.	..	144	....	28
3.00 A.M.	..	160	....	24
4.00 A.M.	..	120	....	24
5.00 A.M.	80	..	....	24
6.00 A.M.	136	..	....	24
7.00 A.M.	48	140	....	24
7.30 A.M.	..	188	....	24
8.00 A.M.	..	184	....	24
8.30 A.M.	..	?	....	24
9.00 A.M.	..	180	....	24
9.30 A.M.	..	172	....	24
10.00 A.M.	..	160	....	22
1.00 P.M.	..	186	....	24
1.30 P.M.	..	192	....	22
2.00 P.M.	..	200	....	26
2.30 P.M.	..	184	....	24
3.00 P.M.	..	180	....	24
4.30 P.M.	..	156	....	22
5.00 P.M.	..	160	....	22
5.30 P.M.	..	164		
6.00 P.M.	..	136	Pulse varying, 200 to 136, irregular and intermittent at times; complains of headache.	24

CASE III. APRIL 14, 1917 (*continued*).

Time.	Pulse. Radial.	Apex.	Notes.	Respiration.
6.30 P.M.	..	136	....	24
7.00 P.M.	..	156	....	24
8.00 P.M.	84	..	....	22
9.00 P.M.	72	..	....	24
10.00 P.M.	80	..	Attack ceased.	24
11.00 P.M.	80	..	....	24
12.00 MID.	80	..	....	24
1.00 A.M.	80	..	April 15, 1917.	24
2.00 A.M.	80	..	....	24
3.00 A.M.	84	..	Attack lasting two minutes; pulse 184; respirations 24.	24
4.00 A.M.	80	..	....	24
5.00 A.M.	80	..	....	24
6.00 A.M.	84	..	Attack of rapid pulse, approximately lasting thirty seconds.	24
7.00 A.M.	80	..	....	24
9.00 A.M.	84	..	....	22
11.00 A.M.	108	..	....	22
1.00 P.M.	160	..	....	22
3.00 P.M.	120	..	Attack lasting two minutes; pulse suddenly became very rapid, 204(?), then heart-block about three seconds, then 88 regular.	22
5.00 P.M.	108	..	....	22
7.00 P.M.	106	..	....	22
9.00 P.M.	96	..	....	22
11.00 P.M.	84	..	....	24

Several questions arise in connection with these cases which are of interest. The first question asked me by physicians is, What is the fate of these children? We have no records of any which have been followed from childhood to adult life. We cannot say, therefore, whether the abnormal condition of the heart innervation leads ultimately to exhaustion of the heart muscle with all the symptoms of heart weakness and ultimate death. This must remain for future observation. It may be that many of these children being attacked by some intercurrent affection die of heart weakness and never reach adult life. The opposite may be true that the heart may ultimately return to its normal innervation. Another point of interest is the management of these cases. They all seem to be perfectly comfortable, if not subjecting the heart to any excessive strain, such as muscular exertion in play or running. It would seem in this that our observations agree with a solitary case in the literature published by Hutchinson and Parkinson of tachycardia in a child, aged two years and eight months. In this case the subjective and objective symptoms were few and resembled closely those of Case I in our series. Digitalis controls but does not cure the condition; on the contrary it is difficult to prevent a digitalis heart-block if digitalis is administered, and it would seem as though the children were as well off without digitalis as with the drug. On the other hand, in a case (as in my Case I) in which the heart threatened to collapse in the first attack of tachycardia, digitalis would seem to have saved the day. In this case the heart is now very sensitive to the use of digitalis, which, even in small doses, is apt to bring about a reduction of pulse rate with heart-block which is disagreeably alarming. So that we may infer that the heart is peculiarly sensitive in these cases to the action of the drug, which must be used in controlling ordinary attacks with extreme caution. The interval use of digitalis in these children is to be rejected. It is to be used in cases only of imminent cardiac failure and collapse.

LITERATURE.

Lewis, T.: Heart, vols. i to vi.
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THE MEDICAL ASPECT OF GASTRO-ENTEROSTOMY.[1]

By Herbert S. Carter, M.D.,
NEW YORK.

For the most part the discussion of gastro-enterostomy has been in the hands of the surgeons, who deserve unstinted praise for having placed this important operation on such a secure scientific footing by ceaseless labor and experimentation. At the same time the subject has a very pertinent medical aspect, for these cases are practically all medical before they are surgical, and they are, or should be, medical *after* they are surgical. In the discussion of the subject that follows, this operation in relation to chronic gastric or duodenal ulcer alone is under consideration.

The reason that these cases are medical before they are surgical is that they should all be given the benefit of a thorough, painstaking, medical cure before surgery is considered, or even two medical cures. This means bed for three or four weeks and the employment of some such diet as von Luebe's as originally planned, or as modified by Lockwood, or a long-continued milk, egg, and cream diet, with or without bismuth and alkalies, as in Sippy's cure. The Lenhartz diet is not to be recommended for chronic ulcer unless the diet for the first six days is used and gradually extended along more conservative lines, and not as planned by Lenhartz. The reason for insistence on one or more thorough medical "cures" is because a fair proportion of cases do get permanently well on this plan of treatment and are spared the operative risks, as is well shown by the following statistics:

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[1] Read before the Medical Section of the New York Academy of Medicine.